SPECIFICATION

TITLE

"APPARATUS HAVING MEANS FOR READJUSTING AT LEAST ONE OPERATING PARAMETER"

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an apparatus having a readjustment mechanism for readjusting at least one operating parameter of the apparatus wherein an average value interval which is typically stored in a memory of the apparatus may be overwritten with a momentary value of the operating parameter so as to define a position of the value interval.

A multitude of currently obtainable apparatus are equipped with display devices with whose assistance settings can be made at the apparatus and modified upon employment of an input apparatus such as, for example, a keyboard. Examples of such apparatus are communication terminal equipment, particularly mobile radio telephone communication terminal equipment. For physical reasons, these display devices are subject to aging processes that make a readjustment of the supply voltage of such display devices necessary, particularly given liquid crystal displays.

There is, thereby, the possibility that the user undertakes a readjustment, due to ignorance or mistake, which leads to the unuseability of the display device. The problem then arises that a further implementation or modification of settings at the apparatus is, practically speaking, no longer possible since the entire user prompting and answer back of such modifications or settings would have to occur over what is now an unuseable display. As a result, the user is subsequently dependent on the assistance of a service technician of his apparatus manufacturer.

A similar situation exists given completely different apparatus that have operating parameters available to them that also must be occasionally readjusted. Here, too, there is the risk that an apparatus condition, wherein specific risks can arise or from which the user can no longer escape by himself by readjustment, is set as a result of improper setting and readjustment of operating parameters.

In order to avoid these problems, the invention has been developed which provides an apparatus with means for readjustment of at least one operating parameter.

SUMMARY OF THE INVENTION

In order to prevent a readjustment of operating parameters of an apparatus into inexpedient ranges or to at least make this more difficult, the present invention provides that the readjustment be limited by a value interval whose average adapts to the momentary value of the operating parameter. As a result, it is particularly the readjustment of operating parameters that are subject to modifications due to aging or slow environmental influences that is simplified. This is advantageous when the readjustment relates to an operating parameter of a display device, for example the supply voltage of a chromatic LCD display, because what is thereby prevented in practice is that a user makes the display device unuseable due to improper readjustment.

The inventive solution develops corresponding and similar advantages in other apparatus whose operating parameters must be readjusted.

Additional features and advantages of the present invention are described in, and will be apparent from, the Detailed Description of the Preferred Embodiments.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows an adjustment interval in a first location.

Fig. 2 shows an adjustment interval in a second location.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is directed to an apparatus that has means available to it for readjusting at least one operating parameter of this apparatus. These can be analog controllers or input keys with which the values of a parameter can be modified dependent on the duration of or the number of times the key is pressed. The present invention then provides that the readjustment of an operating parameter or of a plurality of operating parameters is limited by a value interval that is defined by an interval width and by an average.

The possible parameter values available for the readjustment thus lie within a value interval that extends within an interval width around an average. The smallest parameter value available for readjustment is, thus, the average diminished by half the interval width, and the greatest operating parameter value available for readjustment is the average increased by half the interval width. Preferably, the interval width of a value interval and the average are stored in the apparatus. The interval width, thereby can be stored in a memory specifically provided for this purpose or can be stored as a parameter of software.

In order to then assure that the position of the value interval can adapt to the modified requirements given again of the apparatus or of a component part of the apparatus which makes a readjustment of operating parameters necessary, the present invention provides that the average of a value interval or the averages of a plurality of value intervals be stored such in a memory of the apparatus that it is possible to overwrite the stored averages or the stored average with momentary parameter values.

Given slow changes of the conditions, this measure makes it possible to undertake a corresponding adaption of the position of the value interval so that, despite the modification due to aging or due to environmental influences, it is ultimately always possible to set the required parameter values. At the same time, however, what is prevented is that parameter values that are significantly too high or significantly too low are unintentionally set.

Put in other words, one could speak of what is referred to as a sliding window (value interval) with which it is possible to adjust operating parameter values with continuous variation or by a few steps. Thus, it is not possible to depart from a meaningful or allowed range of the parameter values. Given the apparatus with a display device, in particular, it is thereby assured that an adjustment of the supply voltage of the display which makes reading of the display impossible cannot occur.

It is then provided in a preferred embodiment of the present invention that the momentary parameter value is utilized as the new average of the value interval; i.e., as the new center of the value window. An extremely great range of adjustment (balancing range) thus can thus be had over the useful life without rendering the display unuseable due to improper operation.

This is particularly important given color LCD displays since, in this case, the again process dependent on environmental conditions such as, for example, the temperature can lead to a more or less pronounced color change. This can ultimately lead to unreadability of the display. As a result of the present invention, a corresponding voltage balancing is implemented such that the color change can be always in turn reversed without creating the risk that the display becomes temporarily or permanently unreadable due to a faulty operation or misadjustment of the readjustment.

In its basic form, the present invention provides an apparatus with a readjustment mechanism at least one operating parameter, wherein a value interval whose average is stored in a memory of the apparatus is available for the readjustment of an operating parameter, such that the stored value can be overwritten with the momentary value of the operating parameter. As a result, following a renewed readout of the stored average, the new value thereof defines the position of the value interval.

An example of the operation of a sliding adjustment window according to the present invention is shown in Figs. 1 and 2. The vertical axis 10 in both figures represents the possible values that an adjustable operating parameter may take on over the course of its adjustment range. The possible adjustment values may be continuous, as shown, or they may include a number of discrete values. A sliding adjustment interval 12 defines a limited range of values within which the parameter may be adjusted. Fig. 1 shows the adjustment interval in a first position having an average value of 3.0, whereas Fig. 2 shows the adjustment interval 12 in a second position centered around an average value 2.0, in the embodiment shown. The interval has a width of 1.0 units. According to the invention the parameter value can only be adjusted to a value within the adjustment interval 12. Thus, in fig. 1 where the adjustment interval is centered around a current value of 3.0 the parameter may be adjusted up to a maximum value of 3.5 (3.0 plus ½ the interval width) and down to a minimum value of 2.5 (3 minus ½ interval width).

With time, and under different operating conditions, it may become necessary to adjust the parameter to a value outside the value interval shown in Fig. 1. The position of the value interval is based on the average value of the value interval, 3.0 in the case of Fig. 1. The average value is stored in a memory, along with a value for the interval width. As operating conditions change it is possible to overwrite the stored average value of the adjustment window with a momentary value. In this way continuous adjustment is provided so that the parameter value adapts to changing conditions yet allows manual adjustment only within the range of the sliding interval window. Fig. 2 shows the same value interval 12 as Fig. 1, but with the average value 3.0 replaced with a momentary value 2.0 which was dictated by operating conditions. Thus, the new average value of the adjustment interval take on the value 2.0 of the overwritten momentary value and the position of the adjustment interval is adjusted accordingly.

According to a preferred embodiment of the present invention, an average set at the factory is additionally stored invariably in the apparatus, and the momentarily stored average can be overwritten with the average set at the factory. As such, following a renewed readout of the stored average, the average set at the factory defines the position of the value interval.

Particularly given apparatus having a display device whose operating parameters must be readjusted, a further preferred embodiment of the present invention is especially advantageous in accord wherewith the influence of the readjustment of the supply voltage of the display device can be observed by the user during the readjustment because a test image is displayed on the display device during the readjustment.

In this context, a specific embodiment of the present invention is particularly advantageous when the display is chromatic, in accord wherewith the test image shows areas or objects having different colors during the readjustment, the chromatic values thereof being modified by the readjustment.

An especially advantageous operation of the apparatus derives when stored averages are overwritten with momentary values of corresponding operating parameters when it is shut off, so that the values thereof are read out as new averages when the apparatus is turned on again.

The only thing to be provided for effecting the present invention is a memory possibility for the averages of value intervals in an apparatus, wherein the possibility is to be provided that, dependent on the embodiment of the present invention, these stored values are overwritten with the momentary parameter values dependent on specific use or operating actions or by turning the apparatus off. Dependent on the embodiment of the present invention, it is then provided that the new averages potentially stored at the moment in the apparatus are read out and employed as new averages of a value interval when the apparatus is turned on again.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.